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**NORTH YORK BRANSON HOSPITAL  
ENVIRONMENTAL AND ECONOMIC  
GAINS THROUGH EFFECTIVE WASTE  
REDUCTION AND DIVERSION**

**OCTOBER 1993**



**NORTH YORK BRANSON HOSPITAL**  
**ENVIRONMENTAL AND ECONOMIC GAINS THROUGH**  
**EFFECTIVE WASTE REDUCTION AND MANAGEMENT**


**Final Report to the Waste Management Branch**  
**Ontario Ministry of Environment and Energy**



Report prepared by:

Dawn Ogram, Chair  
Environmental Protection Advisory Committee

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THROUGH EFFECTIVE WASTE REDUCTION AND DIVERSION**

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Submitted by

Dawn Ogram, Chair  
Environmental Protection Advisory Committee

July 28, 1993

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**THROUGH EFFECTIVE WASTE REDUCTION AND DIVERSION**

Final Report to the Waste Management Branch, Ministry of the Environment

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**NORTH YORK BRANSON HOSPITAL**  
**ENVIRONMENTAL AND ECONOMIC GAINS**  
**THROUGH EFFECTIVE WASTE REDUCTION AND DIVERSION**

**ABSTRACT:**

Since 1991, North York Branson Hospital has successfully undertaken several waste reduction and diversion initiatives that have significantly reduced the volume of institutional waste directed to landfill and essentially eliminated chemical waste generated by processes within the Department of Laboratories. The projects were guided by the activities of the hospital Environmental Protection Advisory Committee, which has provided the leadership for identification of recycling priorities and solutions within the facility. Projects priorities were established through waste audits which identified areas that would have the greatest impact on solid waste streams, and on recycling initiatives which would be sustainable in the long run in terms of their operating costs. Three primary projects were undertaken: recycling for paper, glass, cans and plastics; implementation of reusable incontinence products; and implementation of recovery systems for solvents and formaldehyde, two products used in the clinical laboratories. A major factor in the success of the program has been the commitment of staff to the principles of waste reduction, and their willingness to seek creative solutions to problems which were encountered during the planning and implementation phases of the projects. The projects have resulted in the diversion of approximately 130 tonnes/year of solid waste from landfill, and reuse of approximately 3,800 litres of chemical waste annually. Taking ongoing operating costs for all projects into consideration, the capital outlay will be recuperated in approximately four years. Annual operating savings of \$43,220 have been realized through these initiatives. Financial assistance for the capital works portion of the project was provided by the Waste Management Branch of the Ontario Ministry of the Environment.





## I. INTRODUCTION:

In September 1990, North York Branson Hospital established an Environmental Protection Advisory Committee, with the responsibility for researching measures for reducing, reusing and recycling hospital waste, and for guiding implementation of the selected measures. One of the first projects of the committee was to direct the completion of a hospital wide waste audit for the Metro Works Department, which allowed us to assess with a reasonable degree of accuracy our waste volumes and types, and thereby identify those areas where recycling projects would have the greatest impact on diversion of waste from landfill disposal.

As a result of the committee's activities several projects were identified for implementation within the hospital. Waste reduction projects involved the replacement of disposable incontinence products (diapers) with reusable products and the replacement of plastic and styrofoam dishes with reusable for cafeteria and patient use. Recycling initiatives included full implementation of paper, cans and glass recycling and installation of equipment to permit recycling of formalin and solvents used in the Laboratory. While the projects would clearly have a significant impact on waste streams, and would enable the hospital to meet the waste reduction targets established by the Metro Works Department, yet a significant capital outlay would be necessary for their successful implementation. Assistance was therefore sought from the Ministry of the Environment to provide the hospital with capital funding to support the start-up phase of the project.

A proposal for funding assistance was submitted by N.Y.Branson Hospital to the MOE Waste Management Branch on May 3, 1991. The proposal outlined waste volumes and types at that time, the proposed capital needs for each of the projects, and provided substantiation of the economic feasibility of each project. It was originally estimated that



the incontinence products and the solvent/formaldehyde recycling projects would respectively permit recuperation of capital costs in less than five years, while the plastics, paper, glass and cans program would require a longer pay back (closer to eight years), and would enable the hospital to reduce waste directed to landfill by up to 45% (assuming we would be able to recycle 50% of plastics wastes).

Partial funding for the project was provided by the Ministry of the Environment, and preparations for implementation of the waste reduction and diversion programs commenced in the summer of 1991.

## **II. DESCRIPTION OF THE WASTE REDUCTION AND DIVERSION PROJECTS:**

### **1. PLASTICS, PAPER, GLASS AND CANS RECYCLING PROJECT:**

#### **a. Planning:**

Although North York Branson Hospital had for some time prior to commencement of the formal waste diversion projects recycled items such as soft drink cans and computer paper, the implementation of a full recycling program for general institutional waste was contingent upon the acquisition of several items of capital equipment to provide appropriate, sturdy receptacles for use in various locations in the hospital. An additional obstacle to full implementation was the absence of adequate storage space for recyclable waste awaiting collection. The proposed solution to this problem at North York Branson Hospital was the construction of an enclosure to provide protection from the elements for recycling bins, yet provide a reasonable amount of external storage to permit a reasonable, cost effective collection schedule.

An important initiative proposed by the Environment Protection Advisory Committee was the replacement of plastics with reusable dishes for patient and cafeteria use. While this

component of the project was not considered eligible for assistance funding, the project was considered sufficiently important, both from the perspective of public relations as well as for its potential to reduce solid waste, to proceed independent of external funding assistance.

**b. Staff Awareness, Education:**

Implementation of this project was the most straight forward in terms of planning and organizational issues. However, the outcome of the project would impact virtually every individual working within or visiting the hospital. For this reason, effective staff education and awareness programs would prove especially important to the success of the project. Our first waste management inservice program designed to prepare staff for the full implementation was conducted in September, 1991. All waste management practices were reviewed with staff and information was provided regarding the system which would shortly be implemented. Subsequent sessions were undertaken in September, 1992, after implementation had been completed. In addition to these formal sessions, the Environmental Advisory Committee has made use of an internal hospital newsletter (BranScan) to inform staff of the progress of hospital waste management initiatives, ensuring that the profile of recycling initiatives remains high.

**c. Implementation of the Plastics, Glass, Paper and Cans Recycling Program:**

During the second quarter of 1991, plastic dishes were replaced by reusables, which provided significant waste reductions in 1992. To accommodate the organizational changes that would be required for the balance of the project, a phased implementation was undertaken. We proceeded with full implementation of the paper recycling project in late 1991. Full implementation of the balance of this waste diversion project was complete by

April, 1992, following construction of an external enclosure required to store recyclables between collections.

**d. Project Success Measures:**

The success of this project must be measured through examination of its impact on the volume of waste generated in the facility. Several audits were conducted between February, 1991 and June 1993 to assess the impact of the waste diversion projects on these waste streams. The results of these audits appear in Table 1.

Table 1

Material	Feb 91 Tonne/mo	Aug/92 Tonne/mo	Oct/92 Tonne/mo	Feb/93 Tonne/mo	Jun/93 Tonne/mo
Plastics	11.72	4.44	5.20	6.22	4.3
Glass	1.16	0.39	0.43	0.38	0.12
Newspapers and magazines	0.99	1.59	0.60	0.61	0.60
Non-Recyclable office paper	1.16	0.64	0.73	0.69	0.72
Cans	0.74	0.25	0.13	0.03	negligible
<b>TOTALS</b>	15.77	7.31	7.09	7.93	5.74

These comparative figures indicate a decrease of from 50-63% in these waste categories, which comprise approximately 25% of the total waste directed to landfill by North York Branson Hospital. While we have realized a dramatic impact on our plastics waste, the recycling of general plastics continues to provide one of the greatest challenges to institutions, since available markets are limited due to the varieties of plastics used to manufacture products used in every facility. At present we have not considered it feasible to broaden our plastics recycling program, but we continue to work with suppliers to pursue



alternate supplies packaging.

**e. Additional Comments Regarding the Project:**

The waste reductions achieved since February 1991 are evident from Table 1. Not reflected in this table are the actual volumes of waste removed by commercial recyclers. Table 2 provides a breakdown of this aspect of the program, to augment the information provided above:

Table 2.

WASTE TYPE DIVERTED	QUANTITY	BY-PRODUCTS
Office paper	39.96 tonne/year	None
Cans	1.19 tonne/year	None
Newspapers	1.06 tonne/year	None
Magazines	0.97 tonne/year	None
Glass	2.27 tonne/year	None

**f. Economic Impact:**

For projects such as this to be successful, a significant commitment is required of staff and administration. At present the cost of landfill is roughly equivalent to the cost of removal of the wastes by commercial recyclers. What is rarely factored into the cost of waste diversion projects is the indirect cost of waste separation and the additional organizational energy required for the success of these programs. We are of the opinion that while these issues may have played a greater role in earlier cost benefits, the strengthening of environmental protection regulations and desire on the part of facilities to demonstrate corporate responsibility has led to the desire within facilities to research efficient waste separation processes. Compliance with regulations is requiring regular examination of waste

streams within facilities which means that projects which appear to be exceptional and labour intensive will increasingly become accepted as routine practice.

Based on our waste audit findings, we have realized a reduction in solid waste comprising plastics, glass, paper and cans of volumes of approximately 100 tonnes/year. With a capital outlay of \$21,742, and net disposal savings of approximately \$7,964 annually, this project has yielded a highly successful pay back of under three years.

## **2. DIAPERS/INCONTINENCE PRODUCTS PROJECT:**

### **a. Rationale for Project:**

A waste audit conducted in 1991 at North York Branson Hospital indicate that 28% of waste directed to landfill was comprised of non-recyclable paper goods, of which a fair proportion was diapers and incontinence products. The volume of waste of this type is particularly significant at North York Branson Hospital given the numbers of geriatric patients treated in this facility. This project was therefore seen as an ideal way to reduce the volume of waste directed to landfill.

In May 1991 a survey of hospitals and nursing homes in our area which were at the time using reusable incontinence products revealed that disposable products were preferred in terms of their absorbency but that savings could be achieved through use of reusable products. To identify the opportunities for an equivalent undertaking in our own facility, a trial project was undertaken on one nursing unit where a significant volume of disposable products were used.

**b. Product Choice:**

Hospital nursing personnel selected the MediPant product for use within the facility for three reasons. Firstly, the pretrial survey had indicated that the Medipant reusable under pad exhibited superior strength and absorbency, and could be used for lifting and turning elderly, bedridden patients. Secondly the company proposal included the provision of excellent support during the implementation phase, and company representatives would provide assistance in the training of staff in the use of these products. Finally, the company had established an excellent reputation for rapid response to any problems with the products that had occurred in other facilities.

**c. Trial Implementation of Reusable Incontinence Products:**

In June 1991, a 40 bed medical unit with a high proportion of elderly patients awaiting alternate placement began a trial of the MediPant reusable incontinence products. Staff on all shifts received inservice training, and, after discussion with laundry personnel, it was decided that diapers soiled with faeces would be separated from the regular soiled laundry, while other products would be combined with the routine soiled laundry. Both categories of soiled laundry would be collected by laundry personnel according to a mutually acceptable schedule.

After a one month evaluation, nursing identified several problems. Nursing staff reported some difficulty fastening the snaps of the incontinence products, and reported more leakage from reusable products. A MediPant representative visited the hospital on all shifts to address these problems, concluding that the problem of leakage was the result of improper sizing of the product. The importance of appropriate selection of size for each patient was reinforced, and an additional measure was implemented to reduce leakage at



night, specifically the use of reusable liners.

Aside from providing the opportunity for nursing personnel to evaluate the feasibility of a reusable product on this unit, the trial also allowed nursing staff to establish optimal laundry collection routines in order to minimize the soiled linen odour in the utility room. The hospital was therefore in an excellent position to identify with some accuracy the additional labour requirements for this project.

Following a twelve week evaluation, nursing staff were receptive to permanent implementation of the reusable product. Some additional, unexpected advantages were identified during the trial implementation. Nursing staff had observed a decrease in skin rashes since commencement of the project, had confirmed that the under pads are highly absorbent and useful for lifting and turning bedridden patients. Most important, staff are of the opinion that the reusable products provide more dignity to the elderly incontinent patient since they are less bulky than the disposable product.

#### **d. Project Implementation:**

Following this successful trial, reusable incontinence products were implemented hospital wide in August, 1992. To accommodate the increased volume of laundry plus the lengthy drying time required for these products, additional washers and dryers were purchased and installed. Additional staff of 1.4 FTE was required in the in-house laundry facility to augment nursing unit laundry collection schedules and laundry processing.

The full implementation on all nursing units proved as successful as the trial. It is believed that the increasing focus on environmental concerns coupled with current fiscal constraints ensured a climate where staff were more willing to persevere with minor problems and seek resolution to difficulties encountered during implementation.

**e. Success Measures:**

Based on the results of our waste audits prior to implementation of the project and subsequent to implementation, it would appear that an annual volume of approximately 24 to 30 tonnes of waste has been diverted from landfill through this project. This estimate likely fails to reflect the true volumes of waste diverted, since these volumes have not been adjusted to reflect the impact of increased patient cases, which have undoubtedly increased waste volumes. Our waste diversion estimates are therefore conservative.

Revisiting our original cost benefit calculations, it is evident that the benefits accrued through this project have more than met expectations in terms of savings. Taking annual operating costs into consideration (which include the cost of additional laundry labour, water, steam hydro, and capital replacement), the hospital has realized net annual savings of close to \$26,000. This represents a payback of 4.5 years for the project.

**3. SOLVENT AND FORMALDEHYDE RECYCLING PROJECT:**

**a. Rationale for Project:**

The clinical laboratory uses solvents and formaldehyde for the processing of surgical specimens. Since the passage of O.Reg.309 (governing the disposal of hazardous substances) in 1985, the disposal of spent solvents and formaldehyde has proved costly for hospitals. In identifying projects which would have the greatest impact on the environment, the Environmental Protection Advisory Committee at North York Branson Hospital recognised that cost savings could be achieved while providing environmental advantages through a recycling initiative for these chemical wastes. The EPA Committee subsequently proposed that two recycling recovery systems be purchased to manage the two waste streams.

**b. Product Selection:**

The selection of vendor for the solvent and formalin recovery systems was strongly influenced by the desire to deal with one vendor, which we believed would reduce installation and capital costs in the short run, since a common chiller could be installed for both systems, and in the long run would provide efficiencies in service and supply costs. The positive experience of a Hamilton pathology department in using the B/R solvent recovery system, and the fact that B/R Instrument Corporation had recently begun to market a formaldehyde recycling system in Canada resulted in our decision to purchase these systems from B/R, who are the sole supplier for both recovery systems.

**c. Implementation:**

The recovery systems were received in late July, 1992, and were installed in the Department of Laboratories, connected to an external fume duct to provide necessary extraction. The supplier representative provided staff with training in the use and daily maintenance of the system. Recycling of xylene produces two by-products: paraffin wax and a small quantity of ethyl alcohol, each of which is collected and appropriately disposed of. Following resolution of initial implementation problems, the quality of the recycled products has been found to be entirely satisfactory.

**d. Post-Implementation Difficulties:**

A number of technical difficulties were encountered during the installation and initial months of operation of both systems which, we suspect, were in some cases a function of the lack of familiarity of service personnel and staff at N.Y.Branson Hospital with the system. Problems have ranged from faulty solvent overflow mechanisms, plastic coupling leakages and float assembly malfunctions. Each of these minor problems was rectified within



a reasonable amount of time, creating manageable recycling delays. Longer delays occurred when major parts such as the recirculator, the microprocessor unit and the formalin system pot flask required replacement. For each of these problems we found the service representatives at Canada 5 Medical, the local distributor, eager to assist in remedying the problems. Since the systems were under an 18 month service warrantee, no additional costs were incurred for these repairs. We are of the opinion that were the equipment documentation more comprehensive (providing a more complete troubleshooting guide), certain problems could have been addressed in a more timely fashion with telephone assistance from B/R or the distributor. We are also of the opinion that a more comprehensive technical training which addresses not only operating protocols but also system troubleshooting would have provided a greater level of comfort with the system. We have communicated these ideas to company representatives.

One problem of particular note is associated with the formalin recovery system. As a result of a high percentage of bloody specimens, an accumulation of solid material is found to build up on the inside of the flask. A recent solution to this problem has been proposed by B/R, who have suggested that a hypochlorite solution be used to flush the system at regular intervals to loosen the accumulation. We have recently implemented this suggestion and are noticing some improvement.

**e. Success Measures:**

As in the case of the paper, glass and cans recycling project, this project has necessitated a major commitment from staff, specifically the time commitment required of technical staff to supervise the operation of the system, troubleshoot problems and deal with service representatives. The cost justification developed for this project has been based on the assumption that operation of the recycling stills will be accommodated within existing staffing. While the implementation problems experienced with this project have consumed

more staff time than anticipated, we believe that once problems are fully resolved, the system provides a reasonable solution to reuse of this chemical waste. Savings are two fold. Annualized savings in reagent purchases and disposal costs have been in the order of those estimated in our original cost benefit developed for our project proposal to the MOE. Net annual operating savings have been estimated at \$9,300, and take into consideration the supplies required to operate the systems (buffer, etc) and the need for a full service contract to adequately maintain the systems. These savings will ensure that capital costs are recuperated in less than 5 years. We believe that the environmental advantages derived from this recycling initiative outweigh the rather protracted implementation problems experienced with the recovery systems.

Since the systems were installed in August 1992, 990 litres of solvents and 1880 litres of formalin have been recycled. We estimate that after full resolution of implementation difficulties, we will recycle 3,800 litres of waste annually.

### **III. RESULTS AND CONCLUSIONS FOR ALL WASTE REDUCTION/DIVERSION PROJECTS:**

The project specific information presented in the forgoing sections reflects the general impact of our waste diversion projects. As a final summary, the net costs to sustain each project are presented in Table 3:

Table 3.

PROJECT	NET DISPOSAL COSTS (SAVINGS)	NET OPERATING COST (SAVING) (incl.capital replacement)	TOTAL COSTS (SAVINGS) / YEAR	WASTE DIVERTED
1. Plastics, paper, glass cans	(\$7,964)		(\$7,964)	~ 100 t/year
2. Incontinence products	(\$3,390)	(\$22,566)	(\$25,956)	~ 30 t/year
3. Solvents, formaldehyde systems	(\$7,000)	(\$2,300)	(\$9,300)	3,800 L/year

Table 3 illustrates that significant waste diversion has been accomplished along with net annual savings of approximately \$43,220. In consideration of ongoing operating costs for these projects, capital costs will be recuperated in 4.2 years for the entire project. This assumes ongoing service and very conservative incontinence product replacement costs.

As a final summary of the primary outcome from these projects, we have supplied estimates of the waste diverted from landfill or other waste disposal, based on our most recent audit in June, 1993. Our most recent waste diversion estimates are as follows:

Table 4.

WASTE TYPE DIVERTED	QUANTITY
Plastics	60 tonnes/year
Incontinence products	30 tonnes/year
Office paper	39.96 tonne/year
Cans	1.19 tonne/year
Newspapers	1.06 tonne/year
Magazines	0.97 tonne/year
Glass	2.27 tonne/year
Solvents	1500 L/year
Formalin	2300 L/year



Our current projections indicate the continuing success of our waste diversion projects, through audit figures which indicate that our annualized diversion of waste from landfill is in the order of 130 tonnes/year, representing a 33% reduction over our 1991 levels. With a total capital outlay of \$182,785, our current annual net savings exceed \$43,000. The three waste diversion projects undertaken at North York Branson Hospital with the financial assistance of the Ministry Of the Environment Waste Management Branch have produced a successful outcome (in terms of environmental and economic gains) which will be sustainable in the long run.

**APPENDIX 1: SUMMARY OF WASTE AUDIT RESULTS**

<b>Material</b>	<b>Feb 91 Tonne/mo</b>	<b>Aug/92 Tonne/mo</b>	<b>Oct/92 Tonne/mo</b>	<b>Feb/93 Tonne/mo</b>	<b>Jun/93 Tonne/mo</b>
Plastics	11.72	4.44	5.20	6.22	4.3
Glass	1.16	0.39	0.43	0.38	0.12
Newspapers and magazines	0.99	1.59	0.60	0.61	0.60
Non-recyclable office paper	1.16	0.64	0.73	0.69	0.72
Cans	0.74	0.25	0.13	0.03	
Paper goods, not recyclable	9.40	10.03	7.22	6.92	7.65
Miscellaneous	2.80	3.50	3.58	3.53	
Raw food	0.08	0.06	0.08	0.11	10.5
Water in garburator waste	4.95	4.50	4.13	4.31	
<b>TOTALS</b>	<b>33.00</b>	<b>25.40</b>	<b>22.10</b>	<b>22.80</b>	<b>23.89</b>

**APPENDIX 2**  
**COST/BENEFIT DETAILS**  
**PLASTICS, GLASS, PAPER, CANS PROJECT**

**Annual Savings:**

Landfill disposal: (100 tonnes/a @ \$113)	\$11,300
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**Annual Costs:**

Cost for removal by recyclers: (45.45 tonnes/a @ \$73.35/tonne)	\$ 3,336
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<b>Net Annual Savings in Disposal:</b>	<b>\$ 7,964</b>
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<b>Capital Start-up Costs:</b> (includes \$6468:dishes, lowerator)	<b>\$21,742</b>
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MOE Funding Commitment:	\$ 7,637
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Project Payback:	2.8 years
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Hospital Payback: (in consideration of MOE funding)	1.8 years
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### APPENDIX 3

#### INCONTINENCE PRODUCTS PROJECT COST/BENEFIT

##### Annual Savings

Estimated savings on disposal costs: (estimated 30 tonne @ \$113)	3,390
Estimated savings on raw materials: (based on annualized costs, actuals Nov.90-June.91)	103,866

##### Annual Costs

Additional Labour costs: (1.4 FTE @ \$14.34/h)	40,000
Capital replacement: (assumes 75% of product replaced/year)	35,000
Water, hydro, steam:	6,300
<b>Net Project Savings/year</b>	<b>25,956</b>
<b>Start-up Capital Costs</b>	<b>117,358</b>
MOE Funding Committed:	57,407
Project payback:	4.5 year
Payback for Hospital (with MOE funding):	2.3 year

#### APPENDIX 4

##### FORMALDEHYDE/SOLVENT RECOVERY SYSTEMS COST/BENEFIT

###### Annual Savings

Saving on Disposal cost: \$7,000

Saving on new product:  
(Based on 8 mo average,  
Oct.92-May 93: figures very  
conservative, since start up problems have  
necessitated more product purchases than likely  
in the long term) 6,809

###### Annual Costs:

Buffer, other supplies: 1,200

Service Contract: 3,500

Net Annual Savings: 9,300

Start-up Capital Costs 43,685

MOE Commitment: \$21,602

Project Payback: 4.7 years

Payback for hospital: 2.4 years